

Cuyahoga River.—Cleveland, Ohio: ice moved out of the river on the 20th.

Saint Clair River.—Port Huron, Mich.: floating ice on 5th, 6th, and 26th.

Grand River.—Grand Haven, Mich.: the river froze over on the 7th.

Saint Joseph River.—Mottville, Mich.: the ice moved out of the river on the 22d.

Lake Michigan.—Grand Haven, Mich.: vessels were inclosed by ice off this harbor on the 9th and 10th; on 12th the lake was frozen for a distance of forty miles from the shore; heavy slush ice blockaded entrance to harbor on the 29th.

Milwaukee, Wis.: at the close of the month the lake was almost covered with ice, and the strong westerly gales had packed it in large quantities along the east shore. Fields of ice from ten to twelve feet thick, interfering greatly with navigation, were reported off Ludington, Mich. The five steamers which ply between Milwaukee, Grand Haven, and Ludington were for eight days unable to enter either harbor or to get within eight miles of the east shore.

Ohio River.—Louisville, Ky.: the river was almost clear of ice at noon of the 5th.

Mississippi River.—Cairo, Ill.: the steamers "Dakota" and "Norton" left for Saint Louis on the 3d, being the first departure since closing of navigation, and the "City of Saint Louis" the first boat to arrive on the 5th. There was floating ice from the 1st to 17th, on account of which navigation was suspended on the 10th.

Keokuk, Iowa: the ice moved slightly during the night of the 22d; the river was still frozen at end of month.

Des Moines River.—Keokuk, Iowa: ice broke up and moved out of river on the 21st.

Embaras River.—Charleston, Coles Co., Ill.: ice in river, three miles and a half east of this place, broke and moved down the stream on the 20th.

Missouri River.—Fort Buford, Dak.: the river at this place remained almost entirely frozen throughout the month, with slowly rising water.

Leavenworth, Kans.: the ice in the river broke up and moved out on the 19th, navigation having been closed since December 20, 1887. Floating ice on the 23d.

FLOODS.

Lawrence, Douglas Co., Kans.: a sudden rise occurred in the Kansas River at this place on the 20th, which resulted in the washing away of the machinery, valued at several thousand dollars, at the Bowersock's mill.

Norwich, Conn.: the heavy rain of the 20th caused a breaking up of the ice, after which the river rose rapidly and overflowed some of the lower streets.

New Haven, Conn.: the dam of the Fountain Water Com-

pany, at West Ansonia, New Haven County, gave way during the night of the 20th-21st, flooding the valley.

Palmer, Hampden Co., Mass.: a very destructive freshet occurred here during the night of the 20th-21st. The lowlands were flooded for miles to depths reaching ten feet. Numerous dwellings were flooded and many outbuildings and bridges were washed away.

Springfield, Mass.: at Chicopee, in this county (Hampden), on the 21st, the dam of the Dwight Company was carried away by the freshet resulting from the giving away of the ice dam in the Chicopee River.

Fremont, Sandusky Co., Ohio: the lowlands adjacent to the Sandusky River were flooded on the 21st.

Augusta, Me.: the heavy rains of the 21st-22d caused the flooding of basements and cellars of many houses in this city.

Galveston, Tex.: more than three inches of rain fell here in one hour (9.30 to 10.30 a. m.) on the 22d. The capacity of the sewers of the city was not sufficient to carry off the heavy fall of water and consequently the streets were flooded. This was the heaviest rainfall that has occurred since November 2, 1873, when 3.50 inches fell in thirty minutes.

Montgomery, Ala.: the heavy rainfall of the 23d caused the rivers in this vicinity to rise considerably. On the 26th the lowlands opposite this place were inundated.

New Orleans, La.: nearly four inches of rain fell during the storm of the 23d-24th, resulting in the flooding of a considerable area near the city.

Charlotte, N. C.: the heavy rainfall of the 24th caused the streams in this section to overflow. The streets in Charlotte were inundated in some places.

Fort Maginnis, Mont.: the Missouri River at Rocky Point and Gulpin, about sixty miles from this place, rose ten and a half feet on the 24th, and small creeks overflowed.

Augusta, Ga.: the unusually rapid rise in the Savannah River, which occurred from the 24th to the 26th, culminated in an overflow of the river plantations on the last mentioned date. The telegraphic flood warnings, however, which were sent out by the Chief Signal Officer, on the 21st, enabled the planters to remove their farming implements and stock to safe places.

Bordentown, Burlington Co., N. J., 25th: during the past few days the Delaware River has swollen so as to overflow the lowlands on the Pennsylvania side.

HIGH TIDES.

Eastport, Me., 14th and 28th; Southport, N. C., 10th; Fort Canby, Wash., 12th.

Onancock, Accomac Co., Va.: during the high southeast winds on the 27th the tide in Onancock Creek rose seven feet above high-water mark, a height within a few inches of that of the very high water of 1877. The tide came up suddenly and soon subsided.

ATMOSPHERIC ELECTRICITY.

AUORAS.

The most notable auroral display of the month was that of the 8th, which was observed from eastern Montana to the New England coast, and as far southward as the forty-second parallel. Although this display was extensively observed, it does not appear to have been especially brilliant and, so far as reports at hand show, it had no appreciable influence upon the telegraph lines, etc., as is commonly noted during an extended display. Concerning this display, the following notes from the daily journals of observers are given:

Bismarck, Dak., 8th: an auroral arch extended over 75° of the northern horizon and to an altitude of 40° from 10 p. m. until midnight; color, pale yellow.

Fort Totten, Dak., 8th: faint aurora from 8.30 p. m. until midnight, after which time the display became brilliant and lasted until 5.30 a. m. of 9th.

Saint Vincent, Minn., 8th: an aurora appeared at 9 p. m. and continued until 7 a. m. of the 9th; the display consisted of a segment of white light; altitude 12°; azimuth 135°.

Saint Paul, Minn., 8th: auroral light from 11.25 p. m., extending from 165° to 210° azimuth and to 25° altitude at centre, with two streamers reaching upward 43°; these streamers were most of the time pale, but they occasionally attained considerable brilliancy.

Green Bay, Wis., 8th: a faint aurora appeared during the night; it was first seen at 10.10 p. m. in the form of an arch, altitude about 20°, azimuth from 95° to 265°; at 11 p. m. the display was the same as when first seen.

Mackinaw City, Mich., 8th: aurora was observed at 8.40 p. m., as a luminous band, through which the stars were seen; the arch reached an altitude of 25° and covered one hundred and five degrees of the horizon; beneath the arch was a dark segment of 10° altitude.

Erie, Pa., 8th: a faint aurora was observed at 10 p. m.; azimuth 20°, altitude 10°.

Lyons, N. Y., 8th: a diffuse aurora was observed throughout the evening of the 8th.

Manchester, N. H., 8th: an aurora was observed from 9.15 p. m. until 10.40 p. m., consisting of a broad, low arch of bright straw color, extending from about 140° to 220° azimuth, with a dark segment beneath; there were no streamers or flashes, but a steady bright light which reached its greatest brilliancy at 9.45 p. m.

Auroras were observed during the month as follows: 1st, Webster, Dak. 3d, San Diego, Cal.; Northfield, Conn.; Gardner and Orono, Me. 4th, Fort Buford and Webster, Dak.; Moorhead, Minn.; Fort Assinaboine and Poplar River, Mont. 5th, Cresco, Iowa, and Helena, Mont. 8th, Voluntown, Conn.; Garden City, Parkston, Webster, Bismarck, Fort Totten, and Fort Sully, Dak.; Bancroft, Independence, Monticello, and Wesley, Iowa; Cornish, Me.; Cambridge, Blue Hill Observatory, Milton, Provincetown, and Westborough, Mass.; Mackinaw City, Mich.; Moorhead, Saint Paul, and Saint Vincent, Minn.; Poplar River, Mont.; Berlin Mills, Manchester, and Nashua, N. H.; Garrison, Ithaca and Lyons, N. Y.; Lordstown, Ohio; Erie, Pa.; Green Bay, Wis. 9th, Poplar River, Mont. 10th, Saint Vincent, Minn.; Helena, Mont. 11th, Frankfort, Ky. 14th, Wesley, Iowa. 15th, Saint Vincent, Minn. 17th, Webster, Dak.; Wesley, Iowa; Eastport, Me.; Moorhead and Saint Vincent, Minn. 18th, Fort Buford, Dak.; Eastport, Me.; Poplar River, Mont.; Berlin Mills, N. H. 19th, Webster, Dak., and Poplar River, Mont. 23d, Fort Buford and Fort Totten, Dak.

THUNDER-STORMS.

Thunder-storms were reported as follows: 1st, Willcox, Ariz. 2d, Titusville, Fla., and Tribune, Kans. 3d, Archer, Cedar Keys, Limona, Merritt's Island, and Titusville, Fla.; Quitman, Ga.; Biloxi and Palo Alto, Miss.; Brownsville and Corpus Christi, Tex. 4th, Jupiter, Fla.; Abilene, Corpus Christi, Galveston, New Ulm, and San Antonio, Tex. 5th, Fall Brook, Cal.; Alva, Cedar Keys, Jupiter, Limona, Merritt's Island, Tallahassee and Titusville, Fla.; Quitman, Ga. 6th, Alva, Cedar Keys, Jupiter, Merritt's Island, and Titusville, Fla. 7th, Little Rock, Ark.; Alva, Jupiter, Merritt's Island, and Titusville, Fla.; Liberty Hill, and Shreveport, La.; Fort Sill, Ind. T.; Cedar Hill and Palestine, Tex. 8th, Livingston, Mobile, and Mount Vernon, Ala.; Jacksonville, Key West, Titusville, Jupiter, Pensacola, Duke, Limona, and Merritt's Island, Fla.; Quitman, Ga.; New Orleans, La.; Palo Alto, Miss.; Galveston and Palestine, Tex. 9th, Auburn and New Market, Ala.; Cedar Keys, Key West, Merritt's Island, and Titusville, Fla.; Forsyth, Ga. 10th, Auburn, Mobile, and Montgomery, Ala.; Cedar Keys, Duke, Jacksonville, Merritt's Island, Tallahassee, and Titusville, Fla.; Forsyth, Marietta, and Quitman, Ga.; Palo Alto, Miss.; Columbia, S. C.; San Antonio, Tex. 11th, Cedar Keys, Duke, Jacksonville, Limona,

Merritt's Island, Tallahassee, and Titusville, Fla.; Quitman and Savannah, Ga.; Chicamocomico, Raleigh, Southport, and Weldon, N. C.; Charleston, S. C.; Cape Henry and Norfolk, Va. 12th, Cedar Keys, Jacksonville, Key West, Limona, and Titusville, Fla.; Quitman and Savannah, Ga.; Fort Sherman, Idaho. 13th, Montrose, Colo.; Webster, Dak.; Leon de Aldamas, Mexico. 14th, Fort Verde, Ariz.; San Antonio, Tex. 15th, Fort Verde, Fort Mojave, Tucson, Whipple Barracks, and Yuma, Ariz.; Brownsville, Tex. 16th, Fort Mojave, Whipple Barracks, and Yuma, Ariz.; Keeler, Cal. 17th, Willcox, Ariz.; Concordia, Kans.; Fort Stanton and Lava, N. Mex. 18th, Lebo, Manhatta, and Tribune, Kans.; Fort Reno and Fort Supply, Ind. T.; Conception, Mo. 19th, New Market, Ala.; Lead Hill and Little Rock, Ark.; Cairo, Collinsville, and Palestine, Ill.; Butlerville, Dana, Indianapolis, Jeffersonville, Laconia, Logansport, Salem, Sunman, and Vevay, Ind.; Fort Madison, Iowa; Frankfort and Louisville, Ky.; Liberty Hill, La.; Palo Alto, University, and Vicksburg, Miss.; Frankfort, Saint Louis, and Springfield, Mo.; Cincinnati, Cleveland, College Hill, Jacksonborough, and Wauseon, Ohio; Ashwood, Austin, Milan, Memphis, and Nashville, Tenn.; Palestine, Tex. 20th, New Hartford, Conn.; Augusta, Ga.; New Orleans, La.; Newburyport, Mass.; Biloxi, Miss.; Readington, N. J.; Setauket, N. Y.; Columbia and Stateburg, S. C.; Nashville, Tenn.; Galveston, Tex.; Middlebrook, Va. 21st, Fort Thomas, Ariz.; Cedar Keys and Sebastian, Fla.; Quitman, Ga. 22d, Pensacola, Fla.; New Orleans, La.; Biloxi, Miss.; Corpus Christi, Galveston, New Ulm, and San Antonio, Tex. 23d, Auburn, Mobile, and Montgomery, Ala.; Hot Springs and Little Rock, Ark.; Pensacola, Fla.; Quitman, Ga.; New Orleans and Liberty Hill, La.; Biloxi, Miss.; Cedar Springs, S. C.; Cedar Hill and Galveston, Tex. 24th, Mobile, Montgomery, and New Market, Ala.; Lead Hill, Ark.; Pensacola, Fla.; Quitman, Ga.; Cairo and Palestine, Ill.; Indianapolis, Jeffersonville, Salem, Sunman, Terre Haute, and Vevay, Ind.; Lexington and Louisville, Ky.; Biloxi, Miss.; Cincinnati, College Hill, Jacksonborough, and Yellow Springs, Ohio; Cedar Springs and Columbia, S. C.; Ashwood, Milan, Chattanooga, Knoxville, and Nashville, Tenn. 25th, Wilmington, N. C.; New Ulm, Tex. 26th, Limona, Fla. 27th, Sacramento and Willows, Cal. 29th, Fort Bowie, Fort McDowell, and Yuma, Ariz.; Fort Lewis, Colo.; Sandwich and Sycamore, Ill.; Fort Supply, Ind. T.; Fort Stanton and Lava, N. Mex.; Oswego, N. Y.; La Crosse, Wis.

MISCELLANEOUS PHENOMENA.

FOREST AND PRAIRIE FIRES.

Keeler, Cal., 12th; Fort Sill, Ind. T., 20th to 22d; Fort Reno, Ind. T., 21st; Duke, Fla., 23d.

METEORS.

Pensacola, Fla., a large meteor was observed in altitude 40°, moving from southeast to northwest, at 8.30 p. m. on the 15th. As the meteor fell it increased in brilliancy and exploded when in about altitude 10°; in the flight it left a brilliant trail.

Meteors were also observed as follows: 1st, Lead Hill, Ark., and Keeler, Cal. 2d, Yuma, Ariz.; Rappahannock, Va. 3d, Middlebrook, W. Va. 4th, Biloxi, Miss., and East Portland, Oregon. 5th, Parkston, Dak.; Clear Lake, Iowa. 7th, Wilmington, N. C. 8th, Auburn, Ala.; Lead Hill, Ark.; Clear Lake, Iowa. 11th, Jacksonville, Ill. 13th, Voluntown, Conn.; Wilson and Elkin, Kans. 14th, Readington, N. J. 15th, Pensacola, Fla.; Vevay, Ind.; Clear Lake, Iowa; Tribune, Kans.; La Crosse, Wis. 16th, Lead Hill, Ark.; Wauseon, Ohio. 17th, Wauseon, Ohio. 18th, Yuma, Ariz. 21st, Jacksonville, Ill.; Clinton, Clear Lake, and Keokuk, Iowa. 22d, Independence, Iowa; Rappahannock, Va. 23d, Taunton, Mass. 25th, Rappahannock, Va. 27th, Jacksonville, Ill. 28th, Kalamazoo, Mich.

MIGRATION OF BIRDS.

Geese flying northward.—Fort Bidwell, Cal., 3d, 7th, 24th, 26th; Charlotte, N. C., 3d, 26th; Chattanooga, Tenn., 3d, 26th; Wakefield, Kans., 10th, 29th; Augusta, Ga., 12th; Linkville, Oregon, 15th; Fort Madison, Iowa, 17th; Yankton, Dak., 18th; Crete, Nebr., and Auburn, Ala., 19th; Ames, Iowa, 19th to 24th; Charleston, Ill., 20th; Fort Reno, Ind. T.; Manson, Keokuk, and Osceola, Iowa, 21st; Manhattan and Topeka, Kans., and Portland, Me., 22d; Mesquite, Tex., 24th; Winnemucca, Nev., 26th; Rappahannock, Va., 26th to 28th; Salina, Kans., and Liberty Hill, La., 28th.

Geese flying southward.—Rappahannock, Va., 10th, 19th; University of Virginia, 20th.

Ducks flying northward.—Charleston, Ill., 20th; Crete, Nebr., 22d; Wakefield, Kans., 22d, 29th; Salina, Kans., 28th.

Ducks flying southward.—Duke, Fla., 23d.

Ducks flying eastward.—Little Rock, Ark., 26th; Fort Verde, Ariz., 29th.

Swans flying northward.—Fort Bidwell, Cal., 21st.

MIRAGE.

Mirages were observed as follows: 1st, Parkston and Readington, Dak. 6th, Corpus Christi, Tex. 7th, Yuma, Ariz.;